Stimulant Use in Extended Flight Operations

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PSYCHOSTIMULANTS, particularly amphetamine, became available in America for clinical use in 1937, and since then have been widely prescribed. More recently, their beneficial effects have been overshadowed by the recognition of a significant abuse potential. Nevertheless, the military services, particularly the Air Force, have recognized the value of psychostimulants under certain conditions. Use of amphetamine, at the direction of the unit commander and under the super-

vision of the flight surgeon, has been sanctioned by some components of the Air Force since 1960 and by the tactical air forces until 1991. In March 1991, following successful completion of Operation Desert Storm, the chief of staff of the Air Force sent a message terminating the policy of allowing in-flight medications, including amphetamines, by Air Force personnel.

This article briefly outlines the historical development, mechanism of action, and effects of amphetamine on normal personnel. It then discusses the value of these agents in military operations, the safety record, and the concerns that may have been the impetus for banning their use. Finally, it concludes that, in light of their value to mission accomplishment—especially in the absence of demonstrable negative effects—the ban on amphetamines should be rescinded.

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Amphetamine is one member of a family of synthetic drugs, similar in chemical structure to the neurotransmitters adrenalin and noradrenalin. Amphetamine is known to enhance the release of naturally occurring neurotransmitters that affect central nervous system neurons (i.e., the brain) and that are involved with peripheral neurotransmission (such as nervous control of muscular contractions). Amphetamine in particular was noted for its striking "central effect"—that of enhanced alertness, with relatively minor physiological effects on blood pressure, heart rate, or gastric motility.[1]

Amphetamine became commercially available for prescription in 1937. Able to decrease appetite markedly in almost all species, it rapidly found favor as a treatment for a number of conditions, including obesity and narcolepsy.[2] Other conditions that occasionally improve with amphetamine usage include hyperactivity in children, depression, and some types of parkinsonism.[3] By 1938, amphetamine was a very commonly prescribed medication.[4] It was considered very safe and was widely used for a variety of physical and mental disorders. However, within a short time, physicians determined that amphetamine's ability to suppress appetite decreases markedly with continued usage, requiring higher and higher doses to maintain the same effect on food intake. Overdose (usually greater than one hundred milligrams) can cause mood changes.[5] They also noted other undesirable side effects that occur with chronic, increasing use, including insomnia, psychosis, euphoria, and paranoia. Additionally, when high doses of amphetamine are ingested, inhaled, or injected, significant mood-altering effects occur, which explains why amphetamine became a drug of choice to abuse in the 1960s and 1970s.[6] These undesirable traits led to the strict control of amphetamine drugs, as is the case to day.

Some military services recognized the potential of psychostimulants to combat fatigue and boredom. The greatest use of the drug reportedly occurred during World War II by German, Japanese, and English troops.[7] Although American troops reportedly did not have access to the drugs, studies were initiated in the late 1940s and 1950s to determine the military significance. The results among healthy subjects were remarkably consistent: in numerous studies using normal, nonfatigued human volunteers—including some military personnel—amphetamine improved performance by about 5 percent on most mental tasks. Reaction time and hand--eye coordination were most significantly improved. Similarly, amphetamine administration restored mental performance of sleep--deprived subjects to nondeprived levels.[8] Additionally, almost all studies found improvement in physical

strength and endurance.[9] In conjunction with other drugs, amphetamine proved very effective for treating motion and space sickness, allowing missions to continue that would otherwise have been terminated.[10] None of the experiments showed a decrease in mental or physical performance of normal subjects taking amphetamine.

Although amphetamine possibly was available during the Korean conflict, the Air Force did not sanction its use until 1960. At that time, Strategic Air Command (SAC) approved limited use of amphetamine, and Tactical Air Command (TAC) followed in 1962. The first widespread use by US military aircrews probably took place during the Vietnam War. Although written documentation is almost entirely absent, interviews with Air Force and Army pilots who used amphetamine during this time give us a picture of a drug that permitted an extended duty day as well as increased vigilance during flight operations.

Side effects described by these pilots include feelings of nervousness, loss of appetite, and inability to sleep. Master Warrant Officer Lance McElhiney, a 20–year–old Cobra gunship pilot in Vietnam, states that some kind of "upper" was available like candy; he reports essentially no control over the dose or frequency of use.[11] Col Paco Geisler, USAF, Retired, used amphetamine as an F–4 pilot during the Vietnam War and later as an F–15 squadron commander during Operation Just Cause. He notes that "the difference in the two situations was amazing. I don't know if the difference is dose or drug formulation or what. But there were no noticeable side effects during Just Cause; we just felt wide awake. But there was none of the nervousness—no feeling `wired' like I remember in Vietnam."[12] Medically controlled use of prescription–quality, small doses almost assuredly accounts for the difference that Colonel Geisler reports.

The policies concerning stimulants ultimately evolved into Air Force Regulation (AFR) 161–33/TAC Supplement 1. TAC sanctioned the use of amphetamine because single–seat pilots are particularly susceptible to the effects of boredom and fatigue during deployments overseas and during extended combat air patrols. Maj David Caskey, an Air Force F–15 pilot, reported using "go" pills routinely when flying from the United States to Germany, Japan, or Thailand. He recounted that some pilots refused to take them, saying they didn't need them; however, he pointed out that one time, an entire flight diverted to a base in England because some pilots simply couldn't stay awake en route to their destination in Germany.[13]

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There is no evidence that aviators attempt to abuse amphetamine if the medication is occasionally made available. And there is virtually no similarity between the effects of high dosages or chronic amphetamine abuse among addicts and occasional, low–dose administration of the same drug to military pilots involved in extended operations.[14] First, military aircrews are a well–screened, intelligent, motivated, and mentally healthy population. A remarkably low incidence of any sort of addictive behavior or other mental pathology occurs in this population. Second, the medication is administered on a case–by–case basis by a flight surgeon working closely with the pilots and under the direction of the squadron commander. The commander or flight surgeon would likely note unusual personality traits, increased drug–seeking behavior, weight loss, or any other indication of maladaptation on the part of the pilots. Third, because the source of the medication is a physician and military pharmacy, the pilot is not exposed to the drug counterculture that

he or she would encounter by obtaining the drugs illegally. Thus, there is no increased availability of amphetamine (or any other drug) for excess or recreational use.

Determining the effect of amphetamine use on safety is not possible because of a lack of applicable reports. Aeromedical after-action reports of Operations Desert Shield/Desert Storm, however, attempted to quantify amphetamine use.[15] Data from anonymous questionnaires found that, of the pilots who responded, 65 percent of them used amphetamine during the deployment to theater, and 57 percent used it at least once during the air war. No one reported adverse side effects, and over 60 percent of the pilots who used the drug said it was "essential" to mission accomplishment.

Of the Class A mishaps occurring during Desert Shield/Desert Storm, several were partially attributed to pilot fatigue, and no pilots were using amphetamine at the time of any mishap. Additionally, there have been no accidents, during training or actual deployment to a theater, in which amphetamine use by the aircrew was either reported or found to be a factor during the accident investigation. Last, there have to date been no medical disqualifications for drug use among aircrews who had previously received amphetamine operationally. Thus, although one cannot prove an improvement in safety, one can say with some degree of certainty that there has been no negative effect.

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Recent laboratory studies comparing dextroamphetamine with placebos in terms of their effect on maintaining performance and alertness in fatigued military pilots have demonstrated clear benefits, confirming earlier results in nonpilot volunteers.[16] Helicopter pilots who received placebos and then flew a simulator from 0100 to 1700 hours after a single night of sleep deprivation displayed significant, progressive deterioration of flight-control skills that would have threatened both safety and mission accomplishment. The problems encountered were especially severe in the morning hours (0300-1000). Even after a slight improvement in the afternoon (due to circadian rhythm), control accuracy did not recover to normal prefatigue levels. When these pilots received amphetamine on a different sleep-deprived night, decrements in performance did not occur. In fact, low-dose amphetamine eliminated the early morning deteriorations in flight skills and maintained performance at prefatigue level for the remainder of the day.

If psychostimulants improve performance effectively and safely, why is there still resistance to their use—and why did the policy change in 1991? The answer seems to be informational, emotional, and political. Most policy makers are ignorant of the facts concerning the effects of limited, low-dose administration of amphetamine on normal personnel. Some people are concerned that crew members might abuse the drug and thus become psychologically or physically addicted or tolerant. Others are concerned about commander abuse—that instead of allowing reasonable crew rest and endurance policies, commanders might rely on stimulants to get superhuman effort out of their subordinates.

These concerns, though deserving of thought, go against the preponderance of evidence collected to date. As noted above, we have not been able to identify a single disqualification for amphetamine use by Air Force aircrews. Although "command abuse" evidently was a problem in World War II and possibly Vietnam, we believe that strict regulations and vastly improved training of our commanders will continue to prevent abuse—just as we have faith that other problems from the Vietnam era will not recur.

There is no evidence of command abuse during recent deployments or during operations in Libya, Grenada, Panama, or the Persian Gulf.

The two other potential concerns are less logical but probably more compelling. First, some people harbor an ill--defined feeling that performance enhancement by chemical means is "immoral," a sentiment evident in myriad regulations prohibiting drug use by athletes, although such use would indeed enhance performance. The second reason is clearly political: military leaders are understandably concerned about misinformation that could be engendered by press accounts of pilot use of amphetamines. In light of the current efforts in drug control, some parties might accuse the Air Force of imposing a double standard.

These are realistic concerns, but they do not justify prohibiting the use of centrally acting stimulants in the military. Using drugs to enhance performance in sports may be "immoral," but war is not a sporting event. Success in combat is not a question of fairness but of power; our weapons and training are designed to maximize combat power. We do not seek to equalize each side's chance of success prior to initiating contact (as we do in sports), but we do seek to obtain every advantage for our forces. However, this does not mean that we should rely upon amphetamine indiscriminately to create a performance edge on every day of combat operations. As with most things in life, we should consider costs and benefits prior to taking specific actions in various situations.

Although properly administered doses of amphetamine can alleviate significant problems in very demanding circumstances (e.g., they can sustain the performance of heavily fatigued, sleep–deprived personnel in combat), an indiscriminate, daily reliance on amphetamine may quickly create more negative than positive effects. Routine administration of stimulants under "normal" circumstances may create problems of drug tolerance, addiction, and various forms of abuse–not to mention physiological changes (in terms of sleep disruption and other side effects) that would ultimately render personnel less effective. However, if amphetamine administration is well controlled and restricted to those short– to moderate--term circumstances requiring severely fatigued personnel to perform continuously, the medication may make the difference between a mission completed safely and effectively, and one that ends in disaster.

In combat, pilots unquestionably are responsible for accomplishing the mission. The issue in this case becomes whether they fall asleep at the controls or whether they avoid disaster by using a drug that enables them to stay awake, maintain vigilance, and safely complete the mission.

Unfortunately, the elimination of amphetamine use has put aircrews at increased actual risk for the sake of eliminating theoretical risk.

Military leaders are justified in their concern about public reaction to disclosure of the military's use of performance--enhancing drugs. The answer may lie in classifying our involvement to avoid media exploitation, educating our leaders and public concerning the unique military value of these medications, or employing some combination of these or other approaches. Unfortunately, the elimination of amphetamine use has put aircrews at increased ac-

tual risk for the sake of elimi nating theoretical risk—a decision that does not pass the test of com mon sense and therefore should be changed.

Notes

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Learning is by no means something we are supposed to do only from the ages of 5 to 21, in buildings called schools, but rather that it is a lifelong process, the proper conduct of which is not only absolutely necessary for the physical survival of individuals but for the survival of entire species.

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